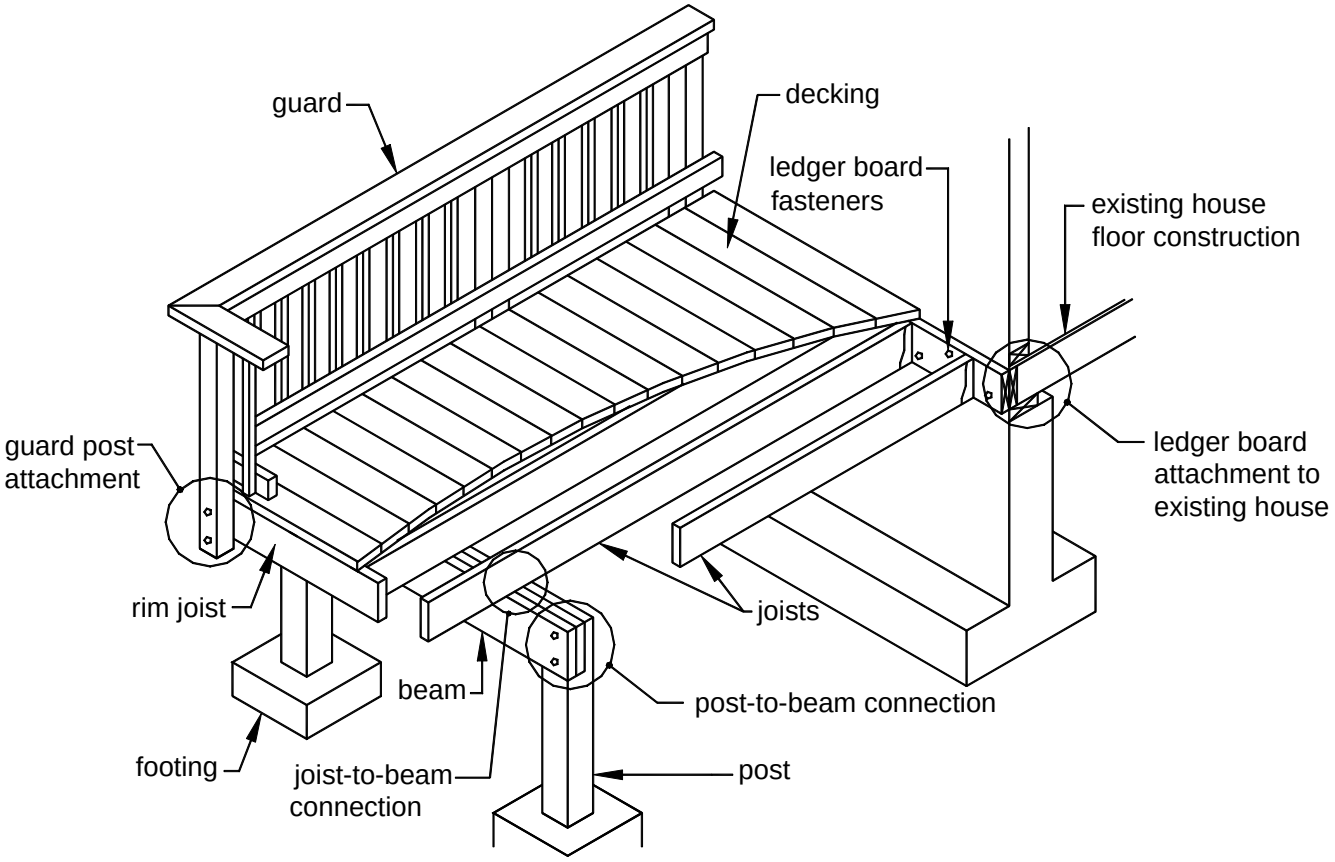
Raleigh, North Carolina

Typical Deck Details

Based on the 2009 North Carolina Statewide Building Code



CONTENTS

THE USE OF THIS PACKAGE IN LIEU OF SUBMITTED DRAWINGS APPLIES TO SINGLE SPAN, SINGLE LEVEL, RESIDENTIAL DECKS ONLY. DECKS MUST BE CONSTRUCTED IN CONFORMANCE WITH THE DETAILS CONTAINED HEREIN. A COPY OF THIS DECK DETAIL MUST BE ON THE JOB SITE AND AVAILABLE TO THE INSPECTOR DURING THE INSPECTION PROCESS.

GENERAL NOTES

1. Unless noted otherwise within these details, all lumber shall be southern pine, grade #2 or better and shall be pressure treated as per NCRC. All lumber in contact with the ground shall be rated as "ground-contact." **Please note: not all treated lumber is rated for ground contact.**
2. All nails shall be as per NCRC.
3. All screws and nails shall be hot-dipped galvanized or stainless steel as per NCRC.
4. All hardware (joist hangers, cast-in-place post anchors, mechanical fasteners, etc.) shall be galvanized with 1.85 oz/sf of zinc (G-185 coating) or shall be stainless steel. Look for products such as "Zmax" from Simpson Strong-Tie or "Triple Zinc" from USP.
5. Decks constructed in accordance with these details are not approved for future hot tub installations.
6. Inspections:
   - A footing and final inspection are required on all decks.
   - Footing inspections are required PRIOR to the placement of concrete. For Footing Details, see AM 104 NCRC.
   - Inspections are required by law. Failure to receive any and all inspections can result in the issuance of violations which may lead to legal proceedings.
7. It is the responsibility of the permit holder or the permit holder's representative to notify the City when the stages of construction are reached requiring an inspection.
8. Decks shall not be used or occupied until a final inspection approval is obtained.

DECKING REQUIREMENTS

All decking material shall be composed of 2x4, 2x6 or $^{5}/_{4}$ ("five-quarter") board. Attach decking to each joist with a minimum of (2) 8d nails or (2) #8 screws. See page 7 for decking connection requirements at the rim joist. Decking may be placed from an angle perpendicular to the joists to an angle of 45 degrees to the joists.

Decking composed of foreign lumber, plastic or manufactured materials may be substituted only when the product has an approved evaluation report from an accredited testing laboratory which has listed the product.

The evaluation report must be on the jobsite and available to the inspector during the inspection process. Installation and span lengths of the substituted material must be in strict conformance with the evaluation report and the manufacturer's instructions. All decking products must be capable of supporting a live load of 40 pounds per square feet.

JOIST SIZE

The span of a joist is measured from the centerline of bearing at one end of the joist to the centerline of bearing at the other and does not include the length of the overhangs. Use TABLE 1 to determine your joist size based on span length and joist spacing. See FIGURE 1 through FIGURE 3 for joist span types.

TABLE 1: MAXIMUM JOIST SPANS[1] (excludes overhangs)

Spacing	2x6	2x8	2x10	2x12
12"	10-9	14-2	18-0	21-9
16"	9-9	12-10	16-1	18-10
19.2"	9-2	12-1	14-8	17-2
24"	8-6	11-0	13-1	15-5

Partial reprint of Table R502.3.1(2), #2 SYP only joist spans

[1] Spans are based on 40 PSF live load, 10 PSF dead load, southern pine#2, normal loading duration, wet service conditions and deflection: $\Delta=\ell/360$.

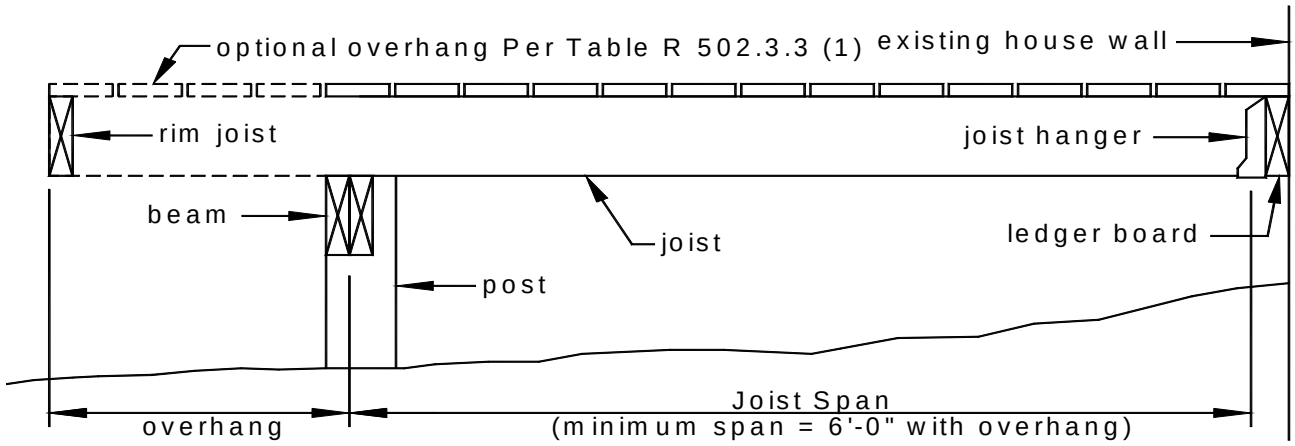


FIGURE 1: JOIST SPAN - DECK ATTACHED AT HOUSE

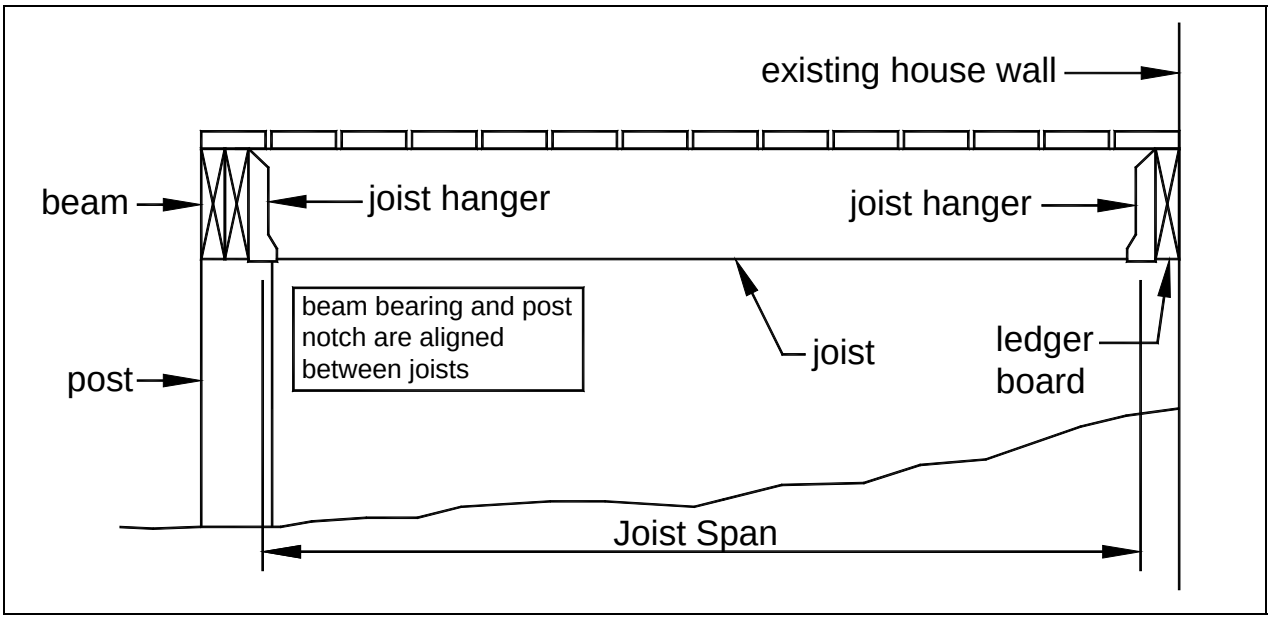


FIGURE 2: JOIST SPAN - JOISTS ATTACHED TO SIDE OF BEAM

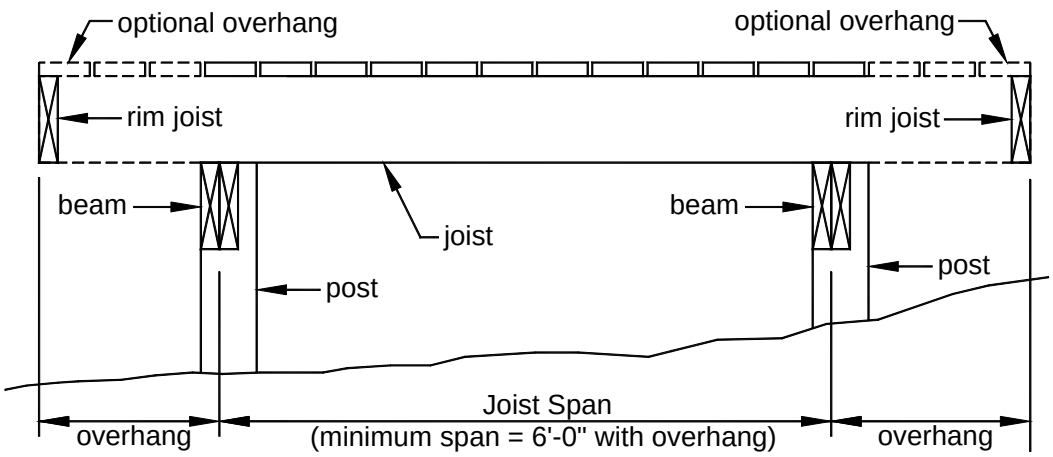


FIGURE 3: JOIST SPAN - FREE-STANDING DECK

BEAM SIZE & ASSEMBLY REQUIREMENTS

The determination of beam size is based on the characteristics of the joist, i.e., span length and overhang. Use TABLE 2 to determine your beam size; see FIGURE 4 for beam span types.

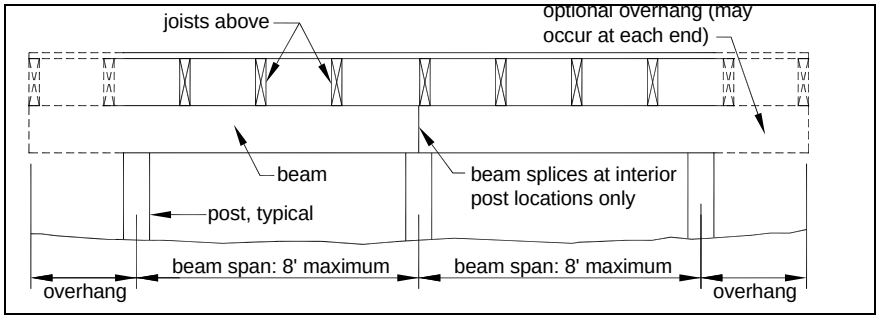


FIGURE 4: BEAM SPAN TYPES

TABLE 2: EXTERIOR GIRDER CLEAR SPANS
APPENDIX M Figure AM111

Exterior Girder Clear Spans

Deck Width	Nominal Lumber Size 2x6	2x8	2x10	2x12
20' (2ply)	3-11	5-0	6-1	7-1
20' (3ply)	---	6-3	7-7	8-10
20' (4ply)	---	---	8-9	10-2

*Partial reproduction of Table R502.5(1) at 30 ground snow load and roof ceiling and 1 clear span floor. Deck width is 20' or less measured in the direction of joists span. Splices in plys must break over bearing supports.

The beam is assembled by attaching the two members identified in the tables on the previous page in accordance with FIGURE 5.

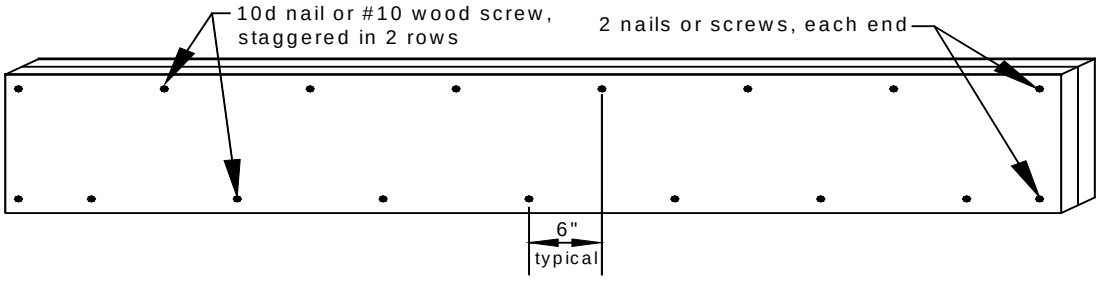


FIGURE 5: BEAM ASSEMBLY DETAIL

DECK FRAMING PLAN

A framing plan shows a bird's-eye view of the joist and beam layout; the location of the ledger board, posts and footings, and the type, size and spacing of the ledger board fasteners. See FIGURE 6 for an example of a typical deck framing plan.

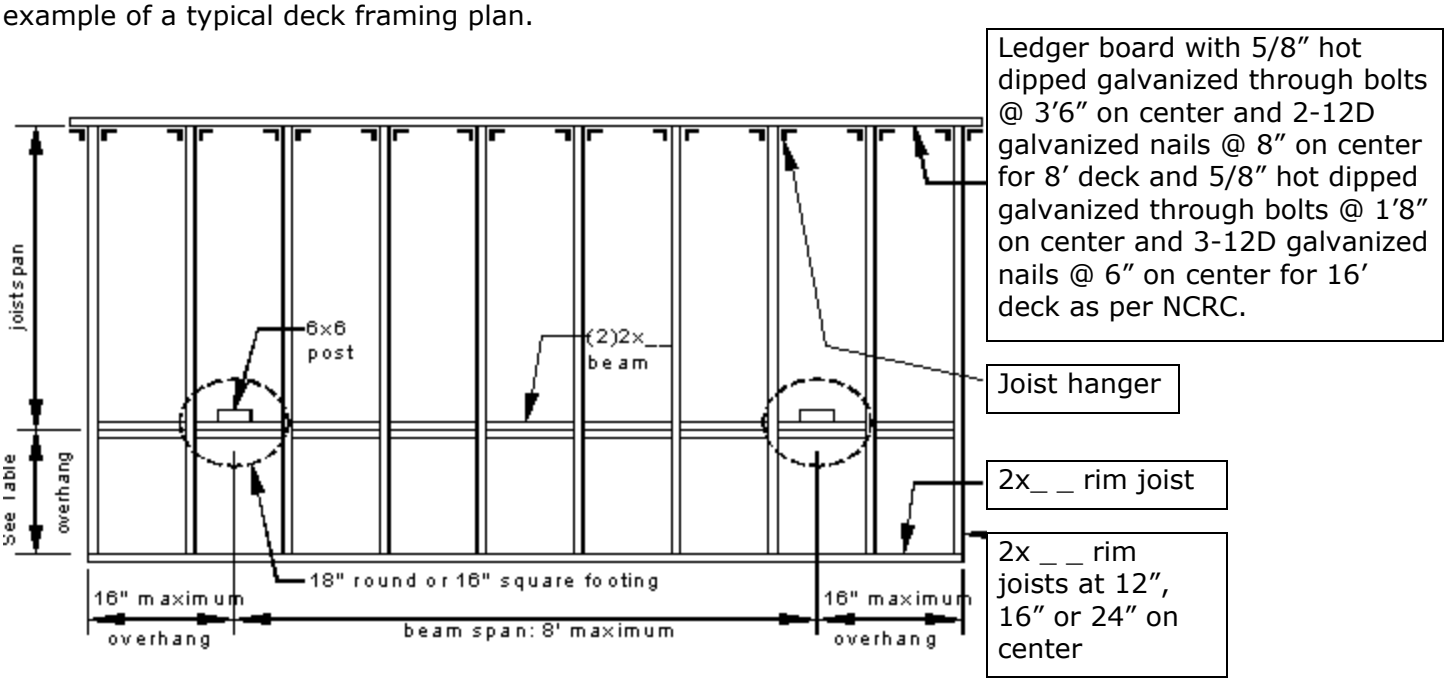


FIGURE 6: TYPICAL DECK FRAMING PLAN

JOIST-TO-BEAM CONNECTION

Each joist shall be attached to the beam as shown in FIGURE 7. Use Option 1 or Option 2 when joists bear on or overhang past the beam; see FIGURE 1 and FIGURE 3. Use Option 3 when joists attach to the side of the beam; see FIGURE 2. See JOIST HANGERS on Sheet 7 for more information.

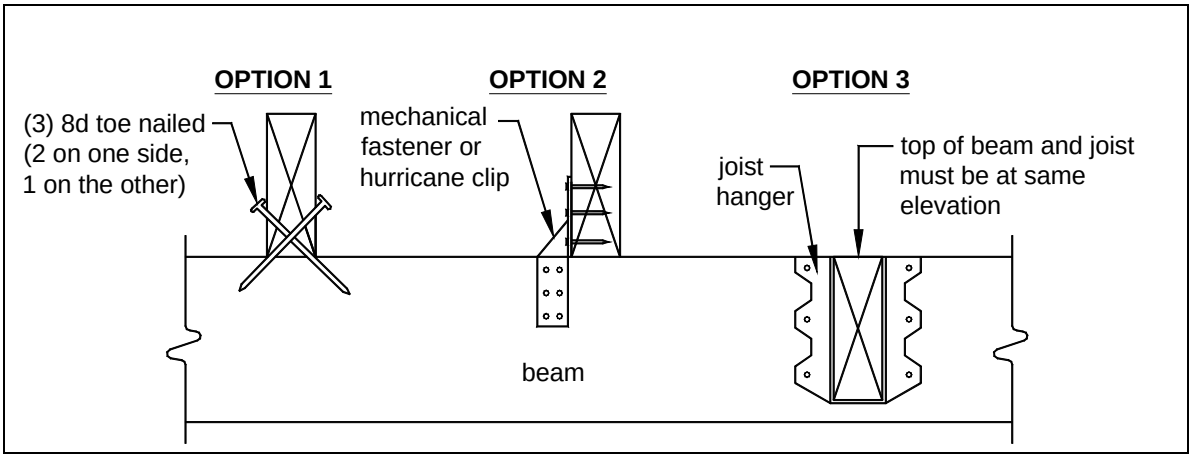


FIGURE 7: JOIST-TO-BEAM DETAIL

JOIST HANGERS

Joist hangers may be used in place of ledger strip as shown in FIGURE 8, shall have a minimum capacity of 1000 lbs each. The depth and width of the joist hanger shall equal the dimensions of the member it is carrying. Joist hangers shall be galvanized with 1.85 oz/sf of zinc (G-185 coating) or stainless steel and approved for the material and method used.

Use joist hangers with inside flanges when clearances to the edge of the beam or ledger board dictate.

Do not use clip angles or brackets to support framing members. Do not bend hanger flanges to accommodate conditions at ledger.

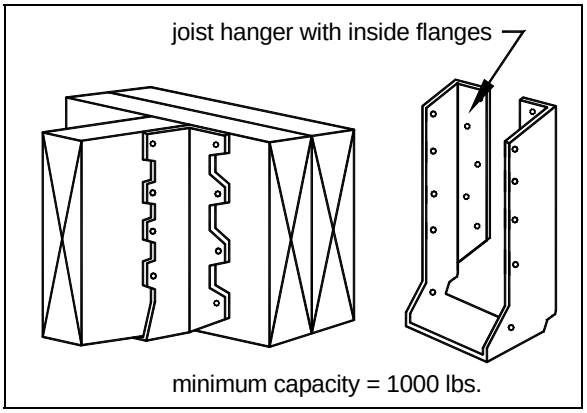


FIGURE 8: TYPICAL JOIST HANGERS

POST REQUIREMENTS

The minimum size deck post that can be used is 4X4 and the maximum height of 8'0" as per NCRC. All notched deck post sizes shall be 6x6, and the maximum height shall be 20'-0". The beam shall be attached to the post by notching the 6x6 as shown in FIGURE 9. All through-bolts shall have washers at the bolt head and nut. See FIGURE 9.

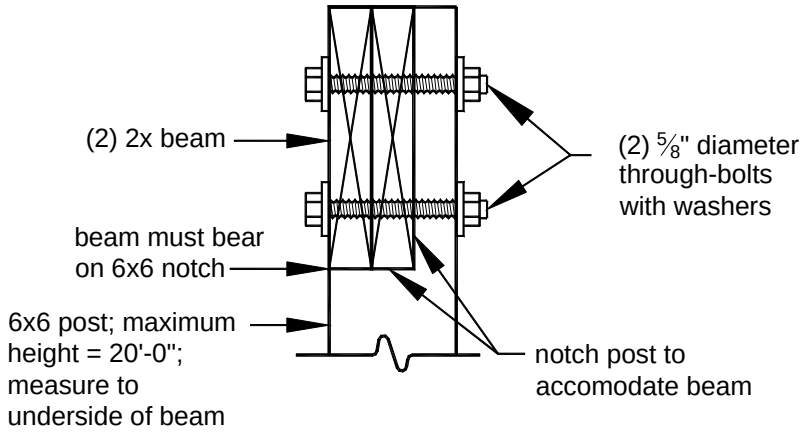


FIGURE 9: POST-TO-BEAM REQUIREMENTS

RIM JOIST REQUIREMENTS

Attach a continuous rim joist to the ends of joists as shown in FIGURE 10. Attach decking to the rim joist as shown in FIGURE 10. For more decking attachment requirements, see DECKING REQUIREMENTS on Sheet 2.

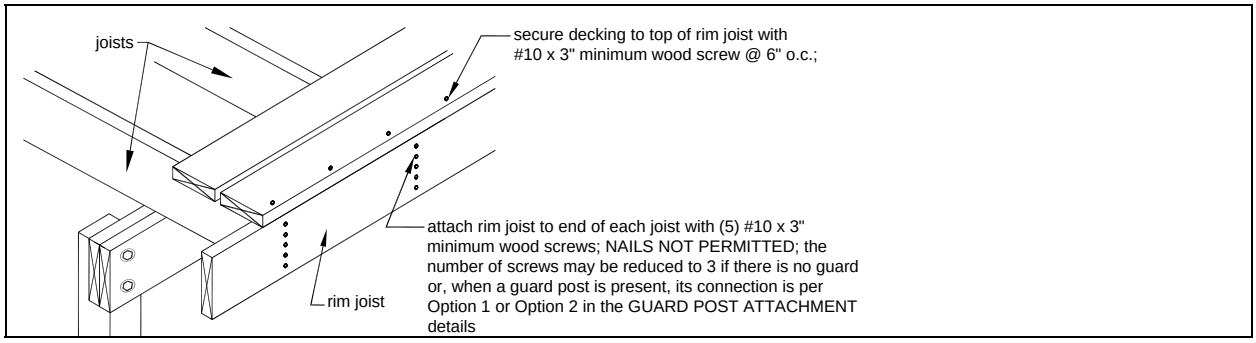


FIGURE 10: RIM JOIST CONNECTION DETAILS

FOOTINGS

See FIGURE 11 for footing size, footing thickness and post attachment options and requirements. All footings shall bear on solid ground; bearing conditions shall be verified in the field by City of Raleigh inspectors prior to placement of concrete. DECK FOOTINGS CLOSER THAN 5'-0" TO AN EXISTING EXTERIOR HOUSE WALL MUST BEAR AT THE SAME ELEVATION AS THE FOOTING OF THE EXISTING HOUSE FOUNDATION.

Do not construct footings over utility lines or enclosed meters. Call "No Cuts" before you dig at 1-800-632-4949. Provide at least two (2) working days notification for Utilities to locate their lines. This is a free service.

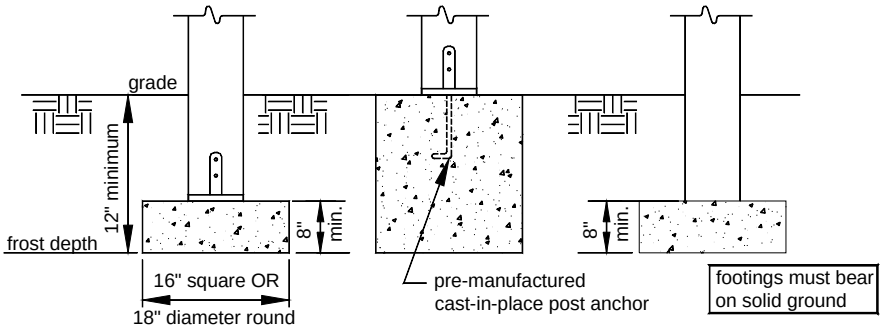


FIGURE 11: TYPICAL FOOTING DETAILS

LEDGER ATTACHMENT REQUIREMENTS

GENERAL: Attach the ledger board, which shall be greater than or equal to the joists size, to the existing exterior wall in accordance with FIGURE 13 through FIGURE 15. When attachments are made to the existing house band board, the band board shall be capable of supporting the new deck. If this cannot be verified or conditions at the existing house differ from the details herein, then a free-standing deck is required. See FREE-STANDING DECKS on Sheet 11.

YOU MUST VERIFY THE EXISTING CONDITIONS IN THE FIELD PRIOR TO APPLYING FOR A BUILDING PERMIT. COMPLIANCE WITH ALL THE REQUIREMENTS HEREIN IS CRITICAL TO ENSURE THE STRUCTURAL STABILITY AND SAFETY OF YOUR DECK.

SIDING AND FLASHING: House siding, or the exterior finish system, must be removed prior to the installation of the ledger board. Flashing is required at any ledger board connection to a wall of wood framed construction and shall be composed of copper (attached using copper nails), stainless steel, UV resistant plastic or galvanized steel coated with 1.85 oz/sf of zinc (G-185 coating). See FIGURE 13 for continuous flashing with drip edge.

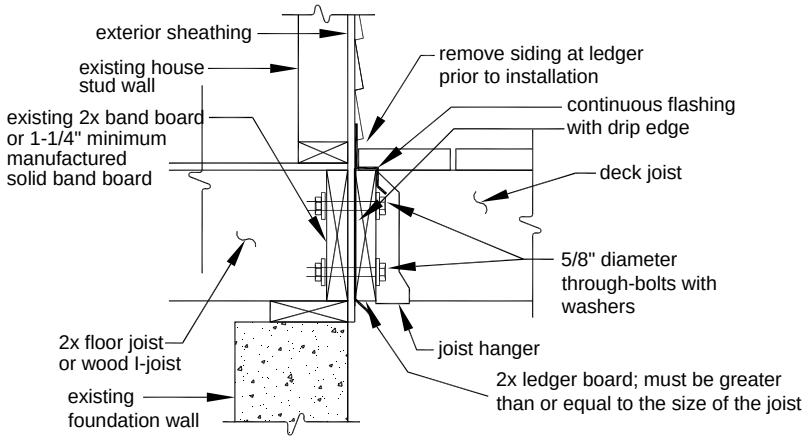


FIGURE 12: ATTACHMENT OF LEDGER BOARD-TO-BAND BOARD

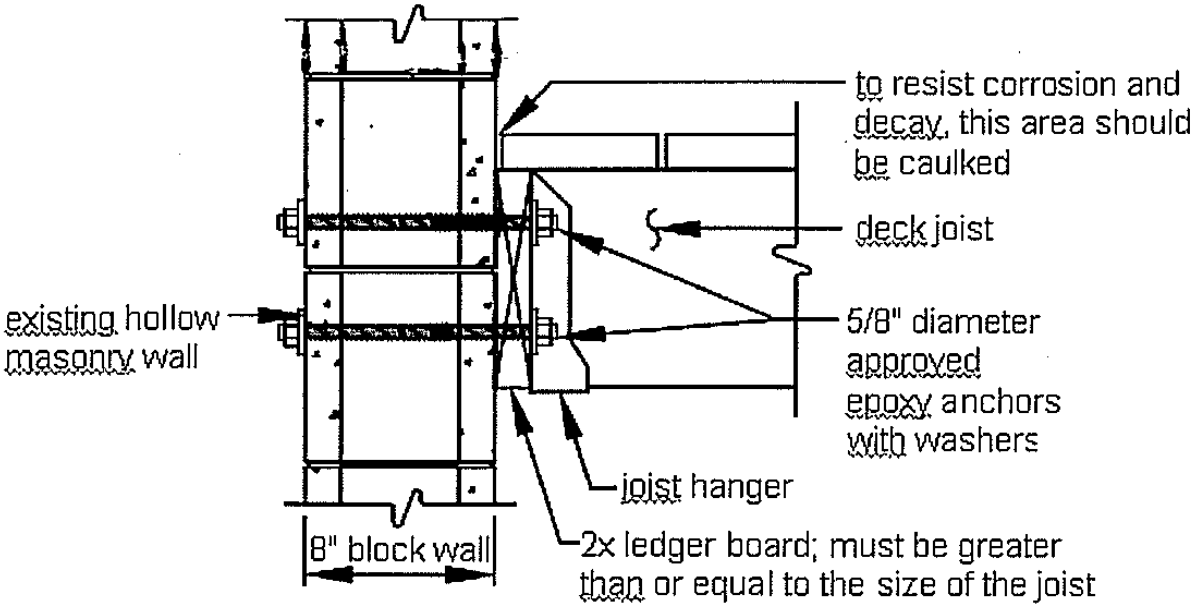


FIGURE 13: ATTACHMENT OF LEDGER BOARD-TO-FOUNDATION WALL (HOLLOW MASONRY)

PROHIBITED LEDGER ATTACHMENTS

Attachments to the ends of pre-manufactured open web joists and to house overhangs or bay windows are strictly prohibited; see FIGURE 17 through FIGURE 19. In such cases the deck shall be free-standing. See FREE-STANDING DECKS on Sheet 11.

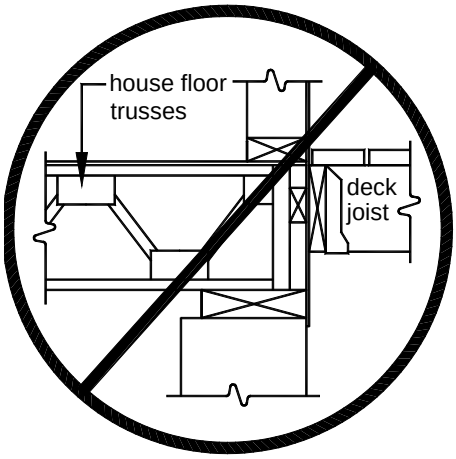


FIGURE 14: NO ATTACHMENT TO OPEN WEB TRUSSES

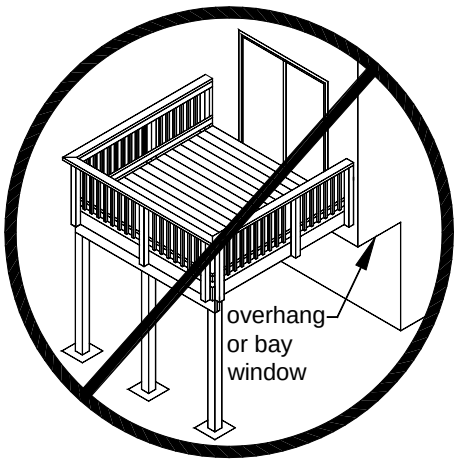


FIGURE 15: NO ATTACHMENT TO HOUSE OVERHANG

LEDGER BOARD FASTENERS

Ledger board fasteners shall be installed in accordance with FIGURE 20 and the spacing in TABLE 3. Only those fastener types noted herein are approved for use; LEAD ANCHORS ARE STRICTLY PROHIBITED. The ledger board must be installed at the time of the footing inspection; adequacy of connections will be verified by inspectors. If a ladder is required to access the ledger board, one must be provided by the property owner, permit holder, or their representative.

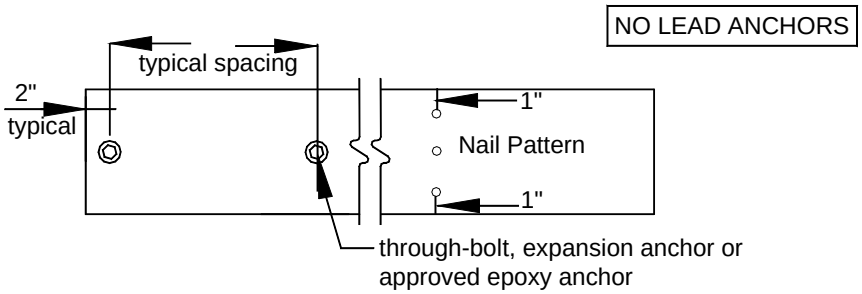


FIGURE 16: LEDGER BOARD FASTENER SPACING AND CLEARANCES

Through-Bolts

Through-bolts shall have a minimum diameter of $^{5/8}$". Pilot holes for through-bolts shall be $^{5/8}$" to $^{3/4}$" in diameter. Through-bolts must be equipped with washers at the bolt head and nut.

FREE-STANDING DECKS

Decks which are free-standing do not utilize the exterior wall of the existing house to support vertical loads; instead, an additional beam with posts is provided at or within 3'-0" of the existing house. THE ASSOCIATED DECK POST FOOTINGS SHALL BE PLACED AT THE SAME ELEVATION AS THE EXISTING HOUSE FOOTING. See FIGURE 3 and FIGURE 22. Beam size is determined by TABLE 2.

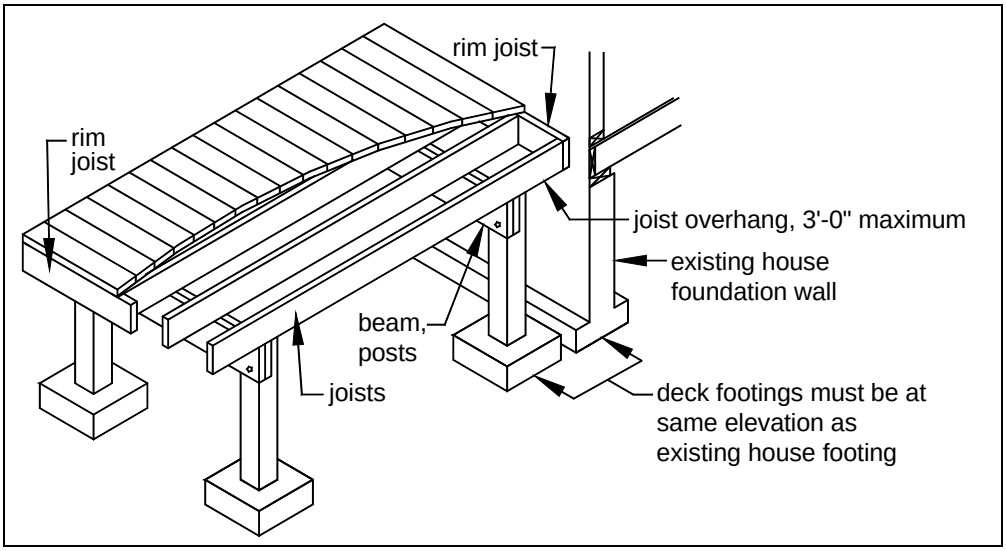


FIGURE 17: FREE-STANDING DECK

LATERAL SUPPORT OF FREE-STANDING DECKS

Free standing decks greater than four (4) feet above grade shall resist lateral loading and horizontal movement by providing diagonal bracing or by attaching the deck to the exterior wall of the house.

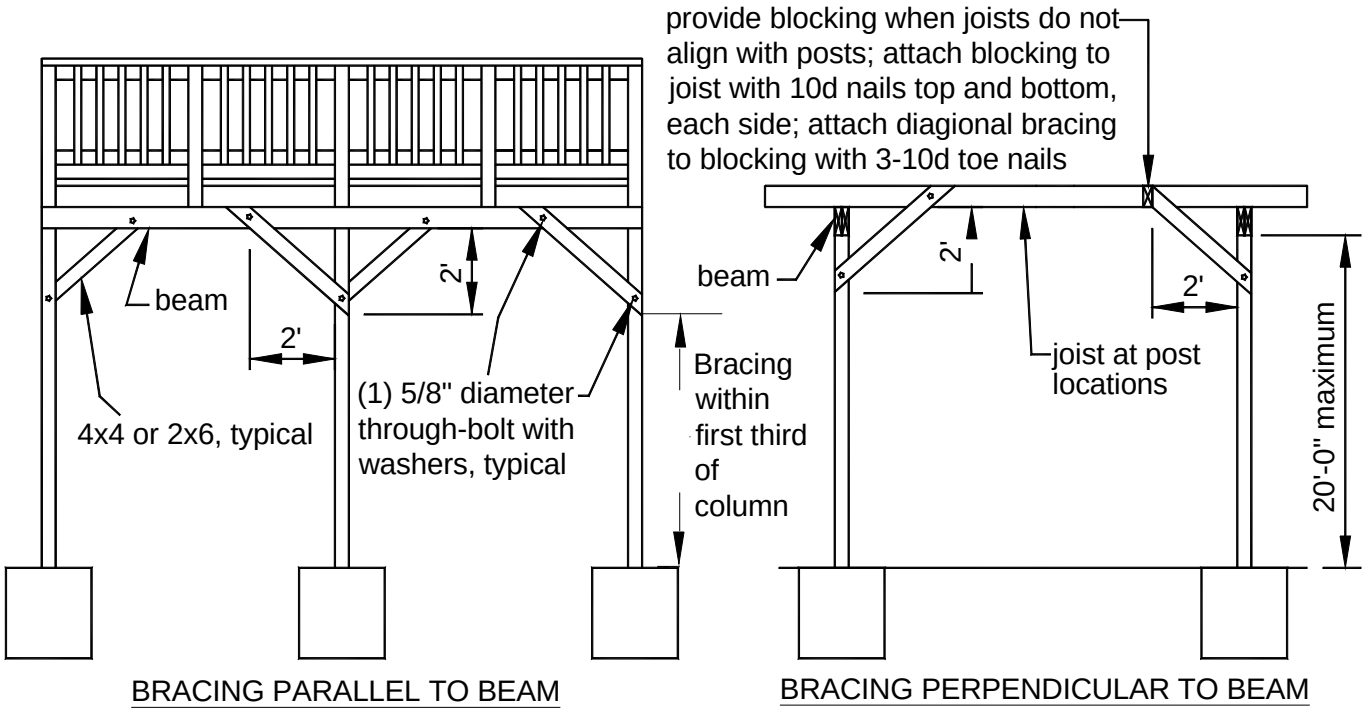


FIGURE 18: DIAGONAL BRACING REQUIREMENTS

Diagonal Bracing: Provide diagonal bracing both parallel and perpendicular to the beam at each post as shown in FIGURE 23. When parallel to the beam, the bracing shall be bolted to the post at one end and beam at the other. When perpendicular to the beam, the bracing shall be bolted to the post at one end and a joist at the other. When a joist does not align with the bracing location, provide blocking between the next adjacent joists; attach as noted in the figure.

Attachment to House: Attach the deck rim joist to the existing house exterior wall as shown in FIGURE 24. The wall must be sheathed with a minimum $^{3}/_{8}$" structural panel sheathing. Use through-bolts when fastening to an existing band board or wall stud; use expansion anchors or epoxy anchors when fastening to solid concrete or solid masonry. LEAD ANCHORS ARE STRICTLY PROHIBITED. YOU MUST VERIFY THIS CONDITION IN THE FIELD PRIOR TO UTILIZING THIS METHOD. Fasteners shall be 1'-8" on center and 3 rows 12d hot dipped galv. nails. Flashing over the rim joist is required and must be installed in accordance with the flashing provisions on Sheet 8.

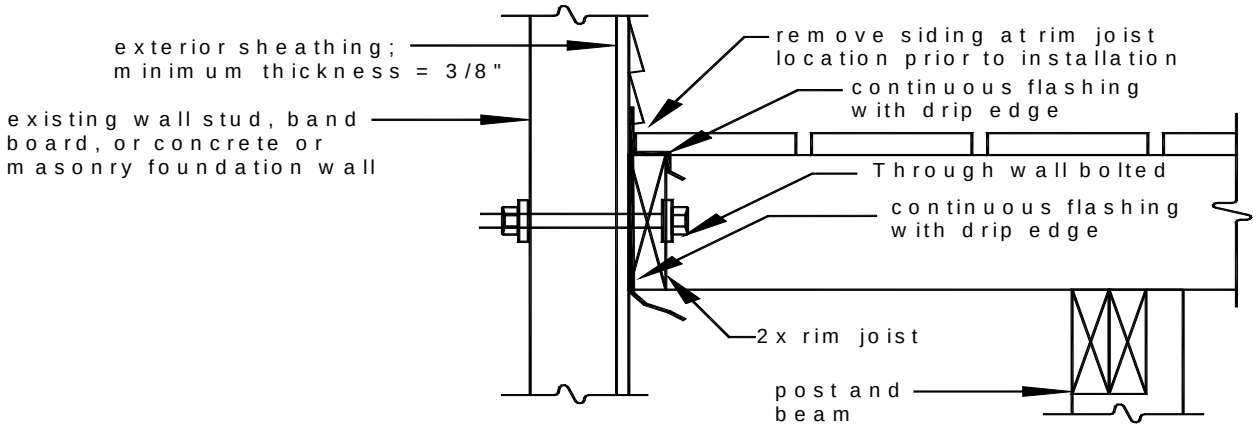


FIGURE 19: ATTACHMENT TO HOUSE LATERAL SUPPORT

GUARD REQUIREMENTS

All decks greater than 30" above grade are required to have a guard. If you are providing a guard when one is not required, it must meet these requirements. All guards shall be constructed in strict conformance with details herein; any deviations require a plan submission.

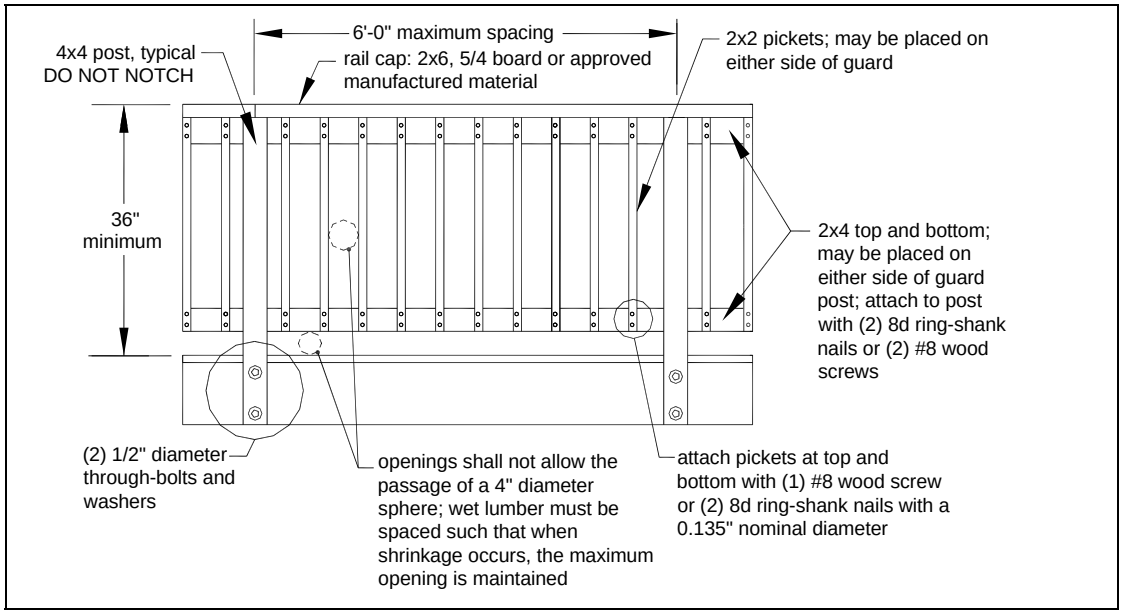


FIGURE 20: TYPICAL GUARD DETAIL

The guard cap may be composed of an approved foreign lumber, plastic or composite material provided the product has an approved evaluation report from an accredited testing laboratory which has listed the product. For a list of approved materials, go to the website below. The evaluation report must be on the jobsite and available to the inspector during the inspection process.

Any guard wholly comprised of a pre-fabricated wood, plastic, composite or manufactured guard system purchased from a home center store, lumber company or similar will require a plan submission. ONLY THOSE SYSTEMS LISTED BY AN ACCREDITED TESTING AGENCY ARE APPROVED FOR USE IN Raleigh, North Carolina.

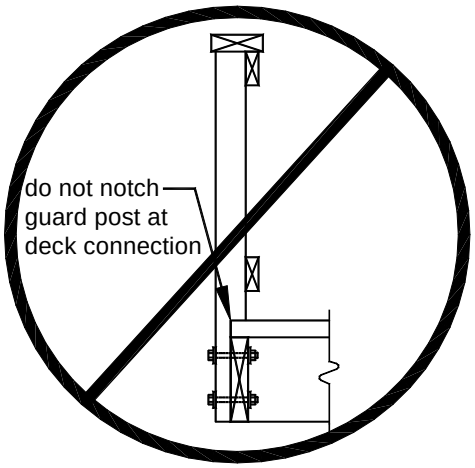


FIGURE 21: PROHIBITED NOTCHING AT GUARD POSTS

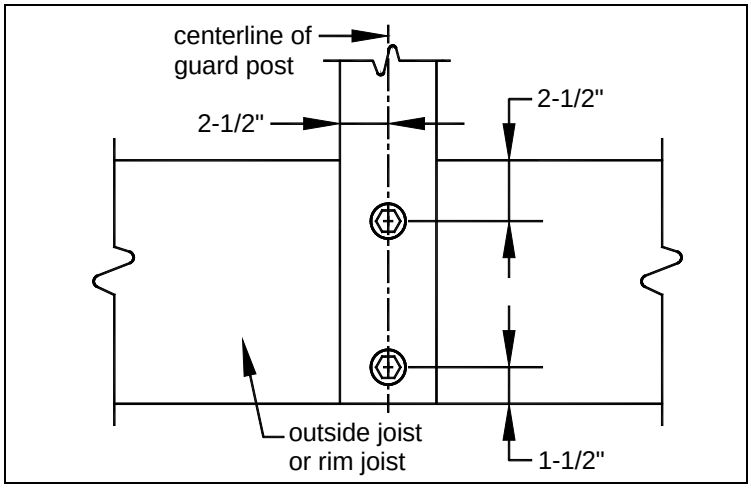


FIGURE 22: GUARD POST ATTACHMENT DETAIL

GUARD POST ATTACHMENTS

GUARD POST TO OUTSIDE-JOIST: Guard posts for guards which run parallel to the deck joists (side of deck) shall be attached to the outside-joist per FIGURE 28.

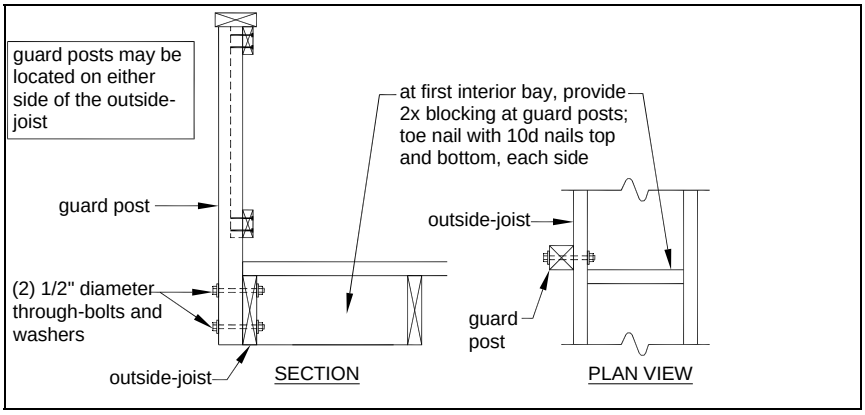


FIGURE 23: GUARD POST TO OUTSIDE JOIST DETAIL

GUARD POST TO RIM JOIST: Use one of the options shown in FIGURE 29 through FIGURE 31 to attach a guard post to a rim joist. See FIGURE 11 for rim joist-to-deck joist and decking-to-rim joist attachment requirements.

OPTION 1: As shown in FIGURE 29, guard posts are attached to the inside face of the rim joists. To attach guard post to the outside of the rim joist, see OPTION 2 or OPTION 3.

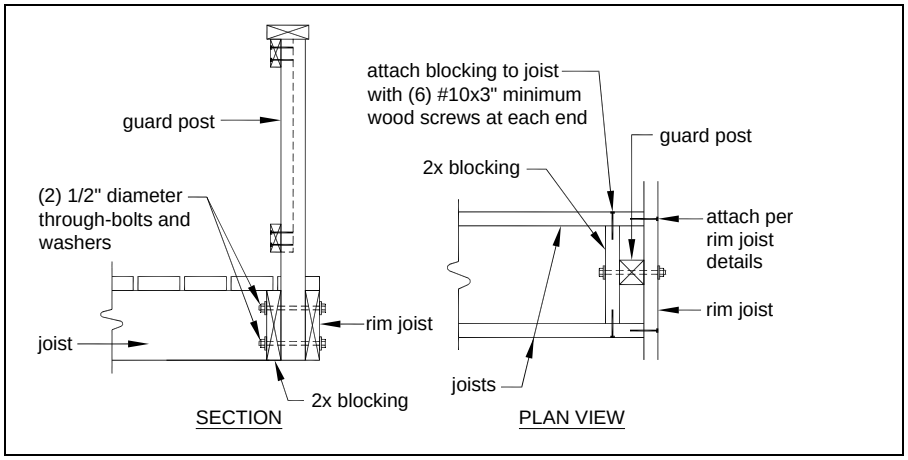


FIGURE 24: GUARD POST TO RIM JOIST DETAIL, OPTION 1

OPTION 2: As shown in FIGURE 30, *hold-down anchors* must be installed to attach the rim joist to the deck joists. There shall be a minimum of two bolts at the anchors' attachment to the joist. Look for model number HD2A in a Zmax coating from Simpson Strong-Tie, model number HD2A in a Triple Zinc coating from USP, or the hot-dipped galvanized DeckLok by Morse Technologies. Other hold-down anchor models meeting the minimum requirements may also be used.

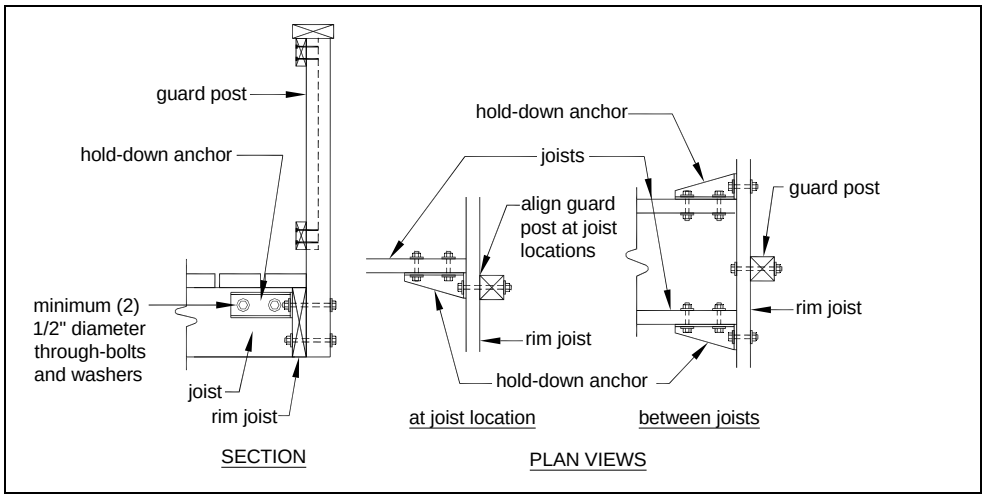


FIGURE 25: GUARD POST TO RIM JOIST DETAIL, OPTION 2

OPTION 3: As shown in FIGURE 31, the rim joist must be fastened to deck joists with two 20 gage *stud tie plates* attached per the manufacturer's instructions with hot-dipped galvanized or stainless steel fasteners. Look for model number SP1 in a Zmax coating from Simpson Strong-Tie or model number SPT22 in a Triple Zinc coating from USP. Other stud tie plate models meeting the minimum requirements may also be used.

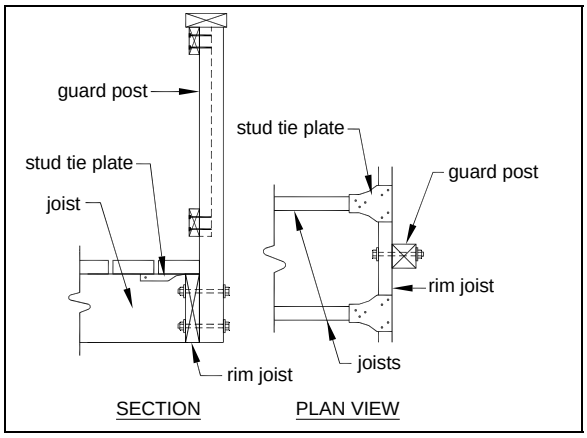


FIGURE 26: GUARD POST TO RIM JOIST DETAIL, OPTION 3

STAIR REQUIREMENTS

Stairs, stair stringers, and stair guards shall meet the requirements shown in FIGURE 32 through FIGURE 38. All stair stringers shall be 2x12 and shall not span more than the dimensions shown in FIGURE 33. If the span exceeds these dimensions, then an intermediate landing will be required. All intermediate stair landings must be designed and constructed as a free-standing deck using the details herein.

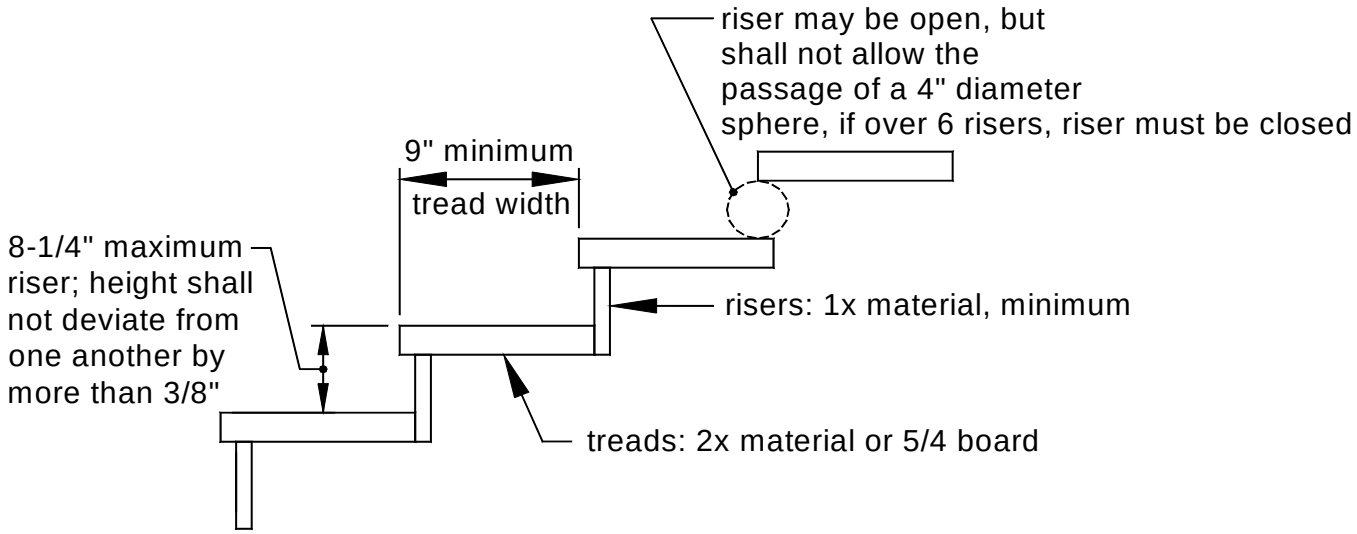


FIGURE 27: TREAD AND RISER DETAIL

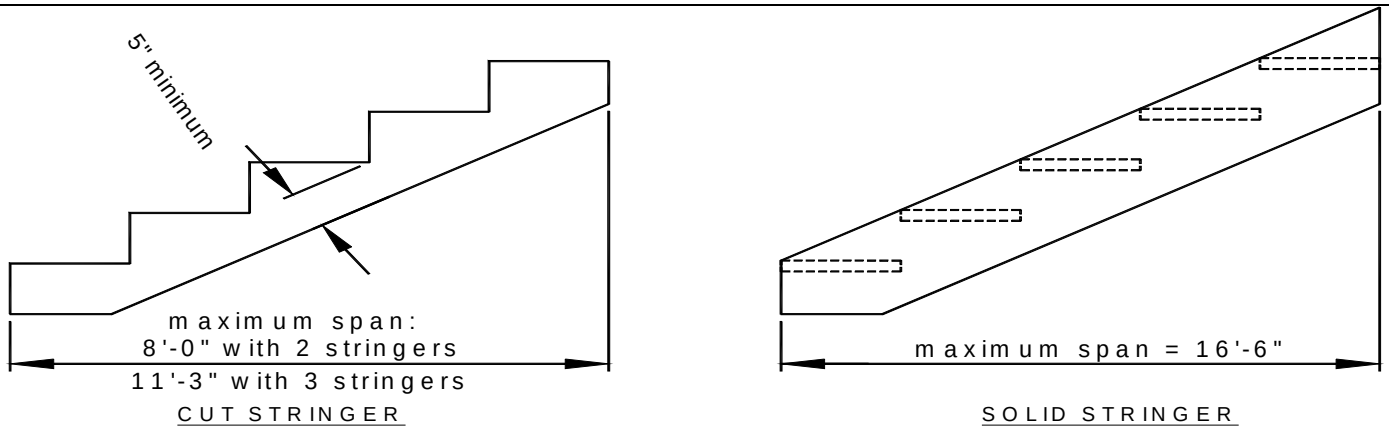


FIGURE 28: STAIR STRINGER REQUIREMENTS

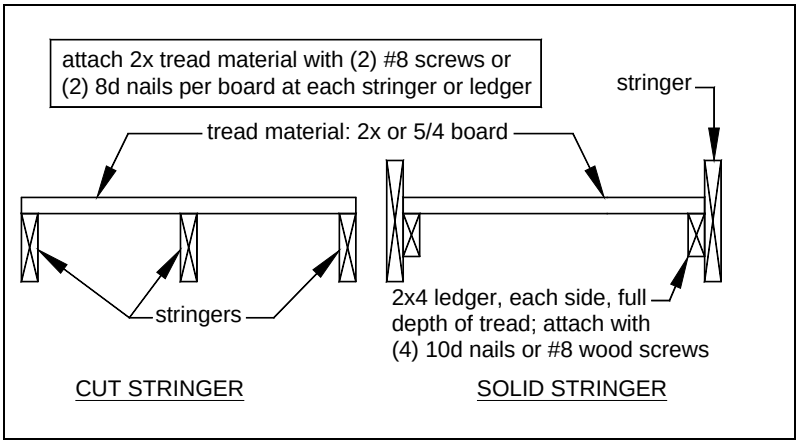


FIGURE 29: TREAD CONNECTION REQUIREMENTS

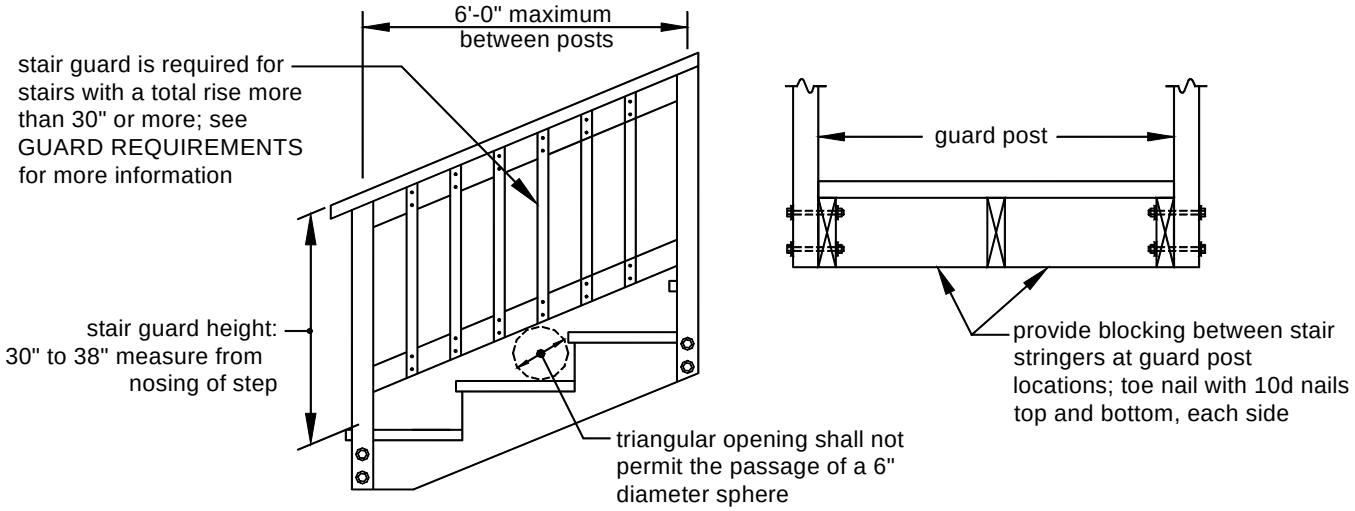


FIGURE 30: STAIR GUARD REQUIREMENTS

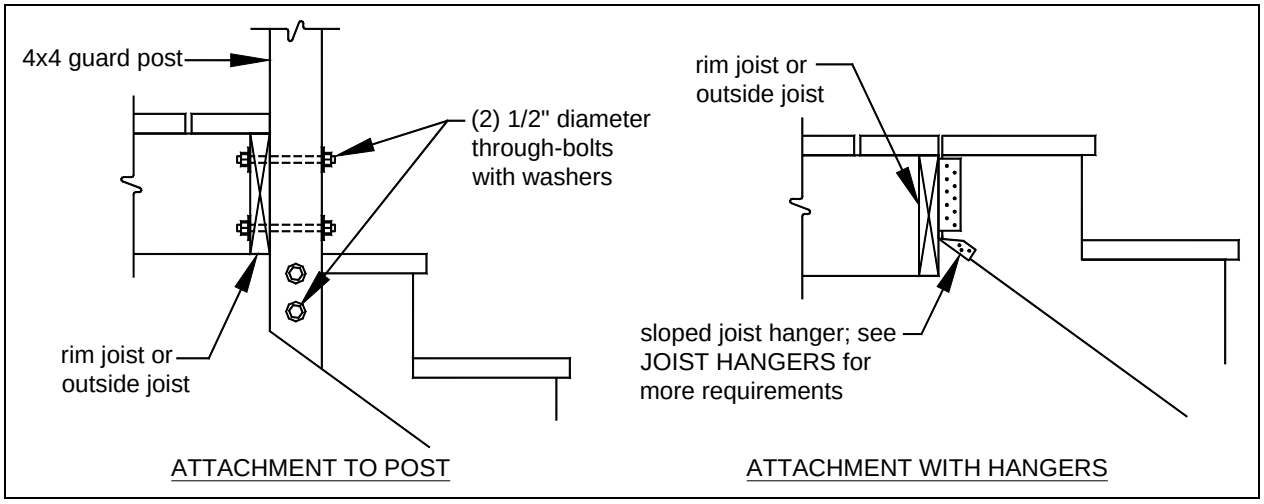


FIGURE 31: STAIR STRINGER ATTACHMENT DETAIL

STAIR HANDRAIL REQUIREMENTS

All stairs with four (4) or more risers shall have a handrail on one side. See FIGURE 37. Handrails shall be graspable and shall be composed of decay-resistant and/or corrosion resistant material. The hand grip portion, if circular, shall be between 1-$^1/_4$" and 2" in diameter. Shapes other than circular shall have a perimeter dimension between 4" and 6-$^1/_4$" with a maximum cross sectional dimension of 2". All shapes shall have a smooth surface with no sharp corners. Handrails shall run continuously from a point directly over the lowest riser to a point directly over the highest riser and shall return to the guard at each end; see FIGURE 39. Handrails may be interrupted by guard posts only at a turn in the stair.

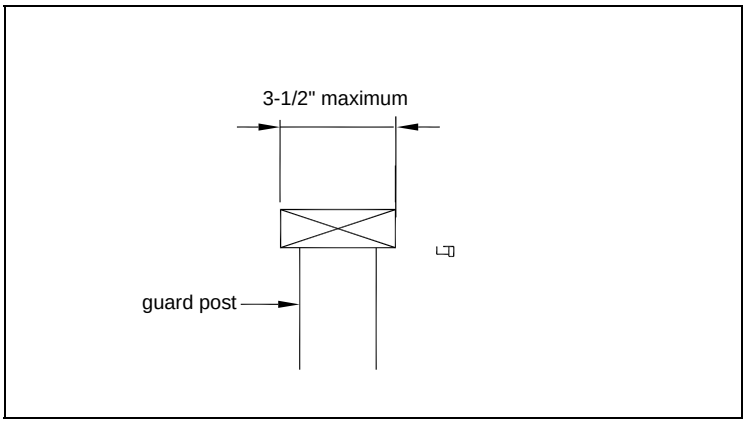


FIGURE 32: HANDRAIL REQUIREMENTS

STAIR FOOTING REQUIREMENTS

Where the stairway meets grade the stair stringers shall bear on a 4" concrete pad minimum. The pad size shall be of sufficient area such that all stringers have complete bearing on concrete and do not come in contact with the ground. See FIGURE 38 and FIGURE 39.

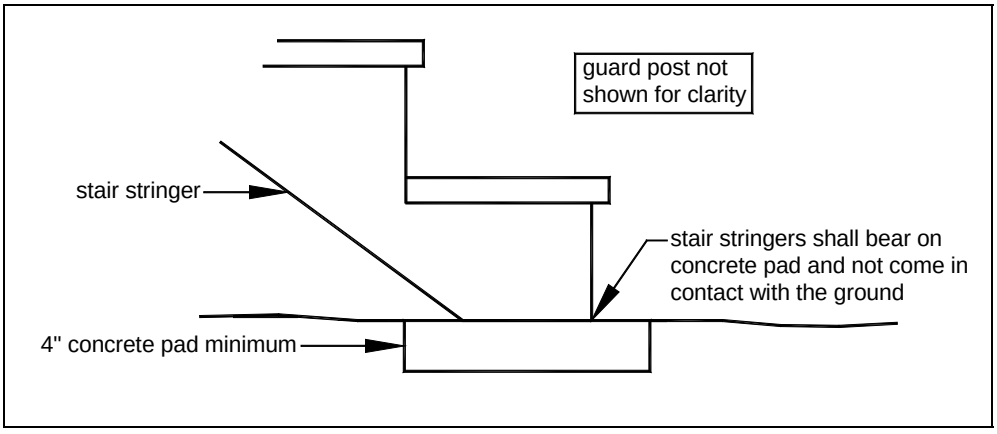


FIGURE 33: STAIR STRINGER BEARING AT GRADE

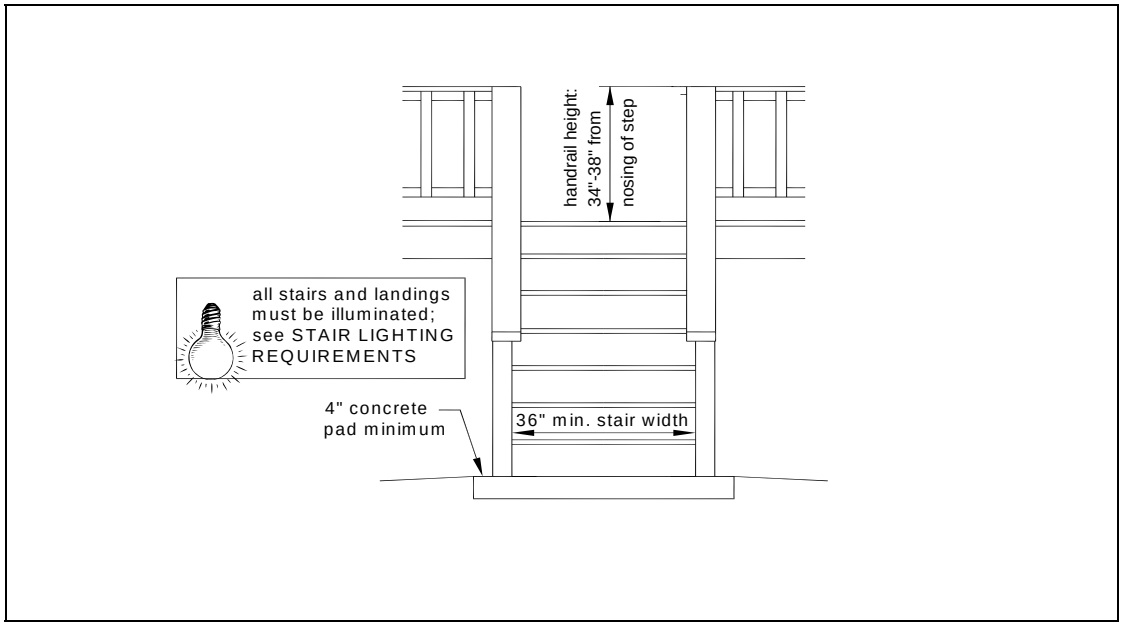


FIGURE 34: MISCELLANEOUS STAIR REQUIREMENTS

STAIR LIGHTING REQUIREMENTS

Stairways shall have a light source located at the top landing such that all stairs and landings are illuminated. The light switch shall be operated from inside the house. However, motion detected or timed switches are acceptable.

FRAMING AT CHIMNEY OR BAY WINDOW

All members at a chimney or bay window shall be framed in accordance with FIGURE 40. Headers may span a maximum of 6'-0". When a chimney or bay window is wider than 6'-0", one or more 6x6 posts may be added to reduce header spans to less than 6'-0". In such cases, the post footing must meet the requirements on Sheet 7. Headers with a span length greater than 6'-0" require a plan submission.

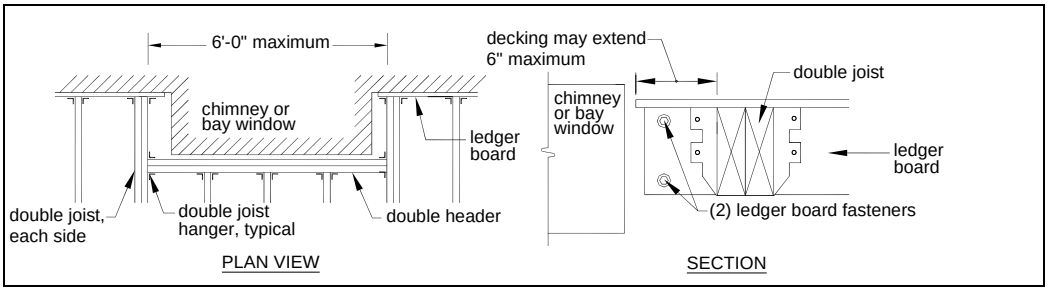


FIGURE 35: REQUIREMENTS FOR FRAMING AT CHIMNEY OR BAY WINDOW

Fairfax County, Virginia has provided details and an example of their brochure for our use. We want to recognize them for their help in preparing this document and their cooperation. We want to especially recognize the author of the original document, Brian Foley, Of Fairfax County Government (www.Brian.Foley@fairfaxcounty.gov).